(1)

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY AVIATION CENTER AND FORT RUCKER
FORT RUCKER, ALABAMA 36362

REPLY ATTENT:

Supersedes AD-A257 924

ATZQ-CDM

MEMORANDUM FOR Commander, U.S. Army Training and Doctrine Command, ATTN: ATCD-ET, Fort Monroe, VA 23651-5000

SUBJECT: Memorandum Report - Evaluation of Communications and Display for Aviation Air Picture (CEP 92-829)

1. Reference, Concept Evaluation Program (CEP) Test Report, dated 30 September 1992 (CEP829).

2. Based on referenced test report the following information is provided for your consideration.

3. Overall evaluation: This CEP evaluated the pilot response to a display of real time tactical threat information in the cockpit. The air threat information from the forward area air defense's (FAAD) command, control, communications, and intelligence (C3I) broadcast was retransmitted through the aviation tactical operations centers (TOC) to Army aircraft. The US Army Aviation Center will use the information gained from this CEP in the requirements documents for the aviation tactical operations center (AVTOC) and the tactical data acquisition and correlation (TDAC) system.

4. Conclusions:

a. Retransmission of FAAD C3I information over high frequency (HF) and very high frequency (VHF) radios in real time is viable. Retransmission in real time of target files from other broadcasts has a potential benefit to Army aviation.

b. Aviators can use the information to perform their missions quicker, with a better chance of survival, and a reduced probability of fratricide.

c. The display media required varies by mission. Attack aircraft need detailed information of threat air tracks. Cavalry, assault, medium lift, and utility aircraft need audio warning and/or a relative position of threat air tracks. Army aviation requires further research and development efforts in this area.

ATZQ-CDM
SUBJECT: Communications and Display for Aviation Air Picture -- Concept Evaluation Program

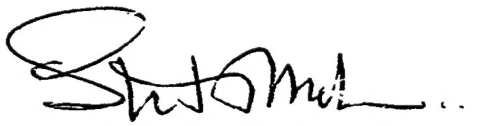
5. Recommendations:

a. That the Electronics Integration Directorate (EID) of the Communications and Electronics Command (CECOM) open a dialogue with the electronic warfare engineering center at CECOM and explore the feasibility of using the APR-39 display for non-radar threat information queuing in the cockpit.

b. That EID, through the TDAC program, continue automation development to reduce pilot workload associated with situation display information in the cockpit.

6. The point of contact at the United States Army Aviation Center is Peter Bartosch DSN 558-3973/4872, Comm 205-598-3641.

FOR THE COMMANDER:



Encl

STEPHEN S. MACWILLIE
Colonel, Aviation
Director of Combat Developments

CF:
Commander:
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SUBJECT: Communications and Display for Aviation Air Picture -- Concept Evaluation Program

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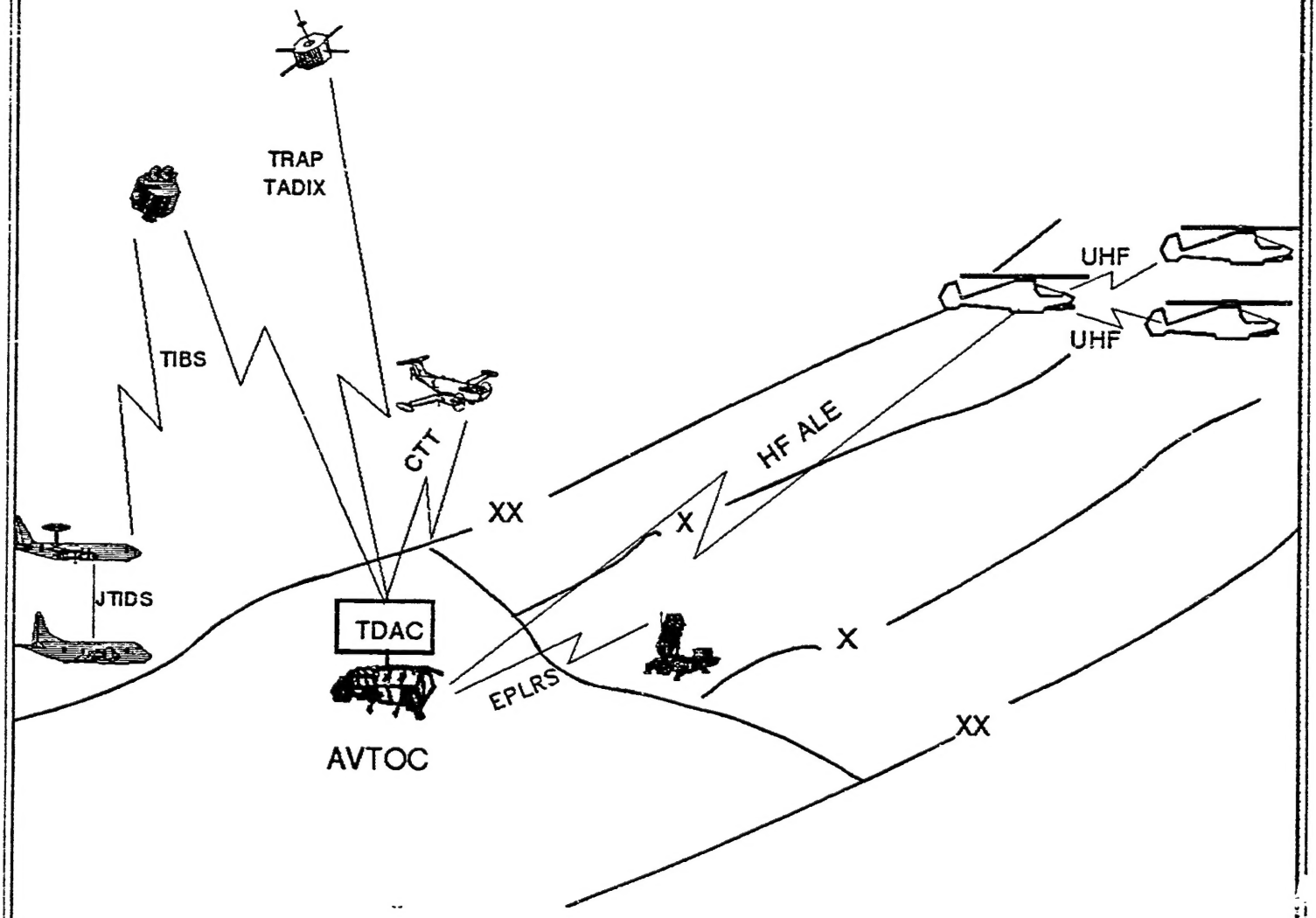
11/20/92 CG

UNITED STATES ARMY AVIATION CENTER

Communications and Display for Aviation Air Picture

CONCEPT EVALUATION PROGRAM
CEP 92-829



CONCEPT EVALUATION PROGRAM

COMMUNICATIONS AND DISPLAY FOR AVIATION AIR PICTURE
30 September 1992

1.0 References:

1.0.1. Memorandum of Instruction - Force Development Evaluation (FDEV) of TRADOC Products of the Concept Based Requirements System (CBRS) dated 13 Jul 1992.

1.0.2 Test and Evaluation Plan for Communications and Display for Aviation Air Picture dated 12 June 1992.

1.0.3 Department of the Army Pamphlet 71-3, Operational Test and Evaluation Methodology and Procedures Guide.

1.1 Purpose and Scope:

1.1.2 The purpose of this Concept Evaluation Program (CEP 92-829) was to evaluate the capability of an aviation tactical operations center to transmit Forward Area Air Defense (FAAD) and other sources of target data to aircraft in the engagement area. This information would be used to avoid or engage threat systems inside the threat systems engagement time line. The key technology parameters evaluated for effectiveness were: (1) Non-Line-Of-Sight (NLOS) Communications (2) medium speed digital data transfer techniques, (3) symbology and display techniques, (4) software engineering using existing equipment on Army aircraft. The results of the CEP will be used to develop requirements document for the tactical data acquisition and correlation (TDAC) system.

1.1.2 SCOPE.

1.1.2.1 This CEP was conducted at Fort Campbell Kentucky utilizing two AH-1S and one OH-58C provided by the Electronics Integration Directorate (EID) of the Communications and Electronics Command (CECOM). These aircraft were the subject aircraft or "Blue Forces". B-Troop 2d Squadron 17th Cavalry Regiment (B-2/17th) provided four AH-1F as surrogate threat aircraft or "Red Forces." A ground station simulating the tactical operations center (TOC) was provided by EID. This TOC provided the missions, acted as the net control station, and provided the air tracks to the Blue Forces. The Red Forces were commanded by the B-Troop platoon leader who provided their mission, net control, and operational parameters.

1.1.2.2 Six Blue Force missions and five Red Force missions were conducted. During each mission the test coordinator (surrogate Blue force commander) and the B-Troop platoon leader coordinated the time phasing of the engagement. One Blue Force mission was a flight to Fort Knox and back to Fort Campbell at night to

evaluate the long haul HF link during the worst period of HF propagation. Due to Nap-of-the-earth flight terrain limitations, the remaining five missions were conducted in the same box (120 square kilometers). Four missions were conducted with air picture activated. The difficulty of the test was the simulation of the threat forces. Since no air defense radar was available, the threat force targets had to be generated by a computer. These computer track files were flown by the Red Forces. This worked out very well. The pilots of B-Troop flew the computer generated tracks precisely.

1.1.2.3 TACTICAL CONTEXT.

1.1.2.3.1 Scenario. Task Force Eagle is embarking on operation Jungle Shield in South America. Eagle is composed of the 1st infantry brigade of the 101st Airborne Division (Air Assault) and elements of the field artillery brigade, aviation brigade, signal battalion, engineer battalion, military police battalion, air defense artillery batteries (vulcan), and other supporting forces of the 101st Airborne Division (Air Assault). The Aviation battalion task force is composed of B-Troop 2/17th Cav, 3d battalion (Apaches), 4th battalion (Blackhawks), and A-Company of the 7th battalion (Chinooks). The mission of the brigade task force is to help the indigenous forces of Escador defend its homeland against their neighbors to the west Partiguy.

1.1.2.3.2 Environment. The weather is hot and humid. The terrain averages 2000 feet mean sea level (MSL) with mountainous areas to the south up to 7000 feet MSL. The terrain is 20% rain forest, 35% open farm lands, 15% mountains, and the rest rolling terrain with towns, forests, and lakes. Two paved highways one running east and west and one north east to south west. The rest of the roads are dirt or gravel. In the west, most transportation takes place on the river or on dirt roads through the rain forest.

1.1.2.3.3 Threat. Partiguy has a large dismounted infantry force which utilizes helicopters for mobility. They have acquired UH-1 and AH-1 aircraft from their neighbors to the south. They have armed these aircraft with weapons acquired from various sources both 1st and 2d world. They pose a serious air-to-air hazard to Task Force Eagle. Among the assets the Partigian army has acquired are former Soviet Union listening and jamming devices, SA-18s, and a host of other modern weapons at "fire sales" throughout the world. They have very few armored vehicles; mostly dismounted infantry and helicopters of all types. These armaments have increased their confidence level to

a high degree. They are not intimidated by a brigade task force from the United States. The Escadorian president is very reluctant to permit large numbers of troops from the U.S. into his country. It would be politically unpopular with the people and to his friendly neighboring countries who do not want a U.S. "puppet" so close at hand.

1.1.2.3.4 Tactics and Doctrine: B-Troops primary mission is to perform route and zone reconnaissance of areas to the west; the most likely avenues of approach of Partiquy forces. B-Troop will conduct these missions during the day. The Apaches will patrol these avenues at night. Partigian forces move mostly at night and conduct early morning ambushes of Escadorian villages and supply points. The Blackhawks and Chinooks will lift Escadorian forces into battle positions to block these raids. The primary mission of the brigade Task Force is to train the Escadorians in air assault tactics, counterinsurgency operations, and weapons. General guidance provided to this point is for the U.S. Forces not to get decisively engaged. Fire only in self defense. Air Force reconnaissance assets are not very effective. They have been unable to get agreements with surrounding countries to fly near the area of concern. They can only fly in international waters over the Pacific over 500 miles away. The air defense artillery batteries in TF Eagle brought with them two new ground based sensor radars.

1.2 Background:

1.2.1 Since Vietnam NLOS communications has become an increasing problem for Army aviation. Aircraft routinely operate beyond line of sight distance from their tactical operations center which provide and receive information to control the operation. Aviation uses tactical command posts (TAC) or "Jump TOCS" to bridge the gap. These TACS are extremely vulnerable to enemy detection and attack because of their close proximity to the engaged forces, and they require manpower which aviation units are critically short.

1.2.2 In Desert Shield and Desert Storm, theater, corps, and special operations units used new technology extensively to receive enemy air track and ground track information directly from overhead platforms. These systems use electronic correlators and are more responsive to the tactical user's needs. Army aviation seeks a means to capture this information at brigade and battalion level, filter it by type and/or geographic area, and send it to friendly aircraft without human intervention.

1.2.3 Army aviation would centrally locate this system in the TOC. The TOC receives the track information and transmits it to the aircraft. In this way, aircraft are not burdened with additional equipment and can display the information on existing display devices in the cockpit.

1.2.4 The FAAD program offered a vehicle to start evaluating this theory. The FAAD has developed software for the transmittal of air track information via the enhanced position location and reporting system (EPLRS). In accordance with the operational facility rules (OPFAC) of the Combined Arms Center (CAC) the aviation TOC is scheduled to receive ELPRS. The aviation TOC is also scheduled to receive NLOS communications radios [nap-of-the-earth communications (NOE COMM) radios]. The OH-58D, AH-64D, and RAH-66 will have a digital data bus, control display devices, and NOE COMM radios. What remains is the addition of some software to display the air tracks received by organic radios and modems.

1.2.5 To this point, most digital NOE COM transmissions have been low speed, 75 bit per second (bps). At this rate 15 target tracks would take about 30 seconds to transmit. A faster speed was necessary because the moving targets change aspect and must be updated repeatedly. The EPLRS provides a refresh rate of 4 seconds on air tracks. In order to handle 15 tracks in 4 seconds a 2400 bps data rate was necessary. As the data rate increases, the signal to noise ratio of the path must increase. The operator can select a lower data rate to accommodate poor communications. The data rate can be lowered automatically to accommodate poor communications and reduce the update rate.

1.2.6 This CEP was designed to evaluate the user's perspective of such a system. What happens when the pilot is presented with this information? How should it best be presented? What affect does it have on the mission?

1.3 Systems Description

1.3.1 Components in the system:

1.3.1.1 Two AH-1S Cobras, acting as surrogate attack aircraft, were outfitted with data buses, control display units (CDU), global positioning systems (GPS), line of sight radios, digital modems, and the necessary software to receive track information from their accompanying scout aircraft.

1.3.1.2 One OH-58C was configured with a data bus, control display units, communications radios, and software to receive the

air track from the ground component and automatically transmit them to his team members (the two Cobras).

1.3.1.3 A commercial van was outfitted with communications equipment, air track generator, and computers to simulate the reception of the EPLRS tracks and send them out to the OH-58C.

1.3.2 The FAAD system was simulated. The EPLRS unit was simulated in software running on a UNIX based computer. The Air Force used a similar system in Desert Storm (Joint Tactical Information Distribution System) which worked fine. The user determined that replication of this portion of the system was not necessary.

1.3.3 The software was written to run on the cockpit display unit of the OH-58C. This is an Intel 80186 microprocessor based system which is very slow by today's standards. This was chosen because it was available at no cost and is the same unit used in the Apache.

1.3.4 The system used two HF radios with automatic link establishment and data modems; one in the OH-58C and one in the ground station. These radios were on hand from previous experiments.

1.3.5 Vitronics Inc. converted two AH-1S' into data bus controlled aircraft using equipment already on hand within the Electronics Integration Directorate of CECOM.

1.3.6 The OH-58C was a left over from an earlier program.

1.3.7 The system design (see enclosed diagram) was as follows:

1.3.7.1 The air track generator provided the cockpit display unit in the commercial van the air track files. The system operator would establish an HF link with the OH-58C. Once the link was established, the system operator would switch on the CDU to send the track files to the HF for transmission to the OH-58C.

1.3.7.2 The OH-58C received the track files over HF and displayed them on the CDU. The CDU took information from the heading reference unit (HRU) and the doppler and displayed relative position of the tracks on the CDU's air picture page. The track files were as accurate as the doppler and HRU with GPS update.

1.3.7.3 The OH-58C automatically transmitted these track files via a digital modem (ATHS) and a line-of-sight radio to the two AH-1S'. A VHF frequency was used on the line-of-sight radio.

1.3.7.4 The AH-1S' received the track files from the OH-58C, compared them to their HRU and doppler position, and displayed the relative position of the tracks on their CDU's air picture page.

1.3.7.5 The AH-1S' and OH-58C aircraft automatically exchanged their own position, providing relative position of friendly units in a "subscriber" file, which could also be displayed on the CDU's in each aircraft.

1.3.8 OPERATIONAL ISSUES AND CRITERIA.

1.3.8.1 Issue: To determine if the air picture can be effectively processed and displayed in the Commander's, attack, and scout aircraft.

1.3.8.2 Criteria: This issue is investigative in nature. Air tracks received by EPLRS then transmitted to the aircraft should be processed without error and displayed so that the pilot can understand the relative position of the treat aircraft in time to react within the threats engagement cycle.

1.3.8.3 Issue: Does the air picture provide a potential for improving mission performance?

1.3.8.4 Criteria: This issue is investigative in nature. A reduction of time to get to attack position and orient weapons should be realized (10% reduction is the minimum desired). The team should be alerted to enemy aircraft and take appropriate action before enemy helicopters are within their engagement range.

1.3.8.5 Issue: To evaluate the Apache ATHS A/I CDU. Is it operationally suitable as the control and display for the air picture?

1.3.8.6 Criteria: This issue is investigative in nature. The display must be readable, compatible with night vision devices, and reliable.

1.3.9 METHODOLOGY.

1.3.9.1 INTRODUCTION. This test was conducted in two phases.

Phase 1 was the control phase. Phase II was the test phase. In both phases the Blue and Red forces operated about 45 kilometers from the base station. This was well beyond line of sight communications range of the radios in the simulated TOC. Track files were sent to the Blue Forces in phase II. By comparing the two events, test officers could determine the relative value of the air picture information.

1.3.9.2 EVENTS.

1.3.9.2.1 On day one through three, a briefing of the CEP objectives to the squadron commander and air-crew training of the Blue Force air-crews took place. This included both classroom and hands on instruction in the aircraft.

1.3.9.2.2 On day four, two AH-1S' and one OH-58C flew an area reconnaissance mission (afternoon) control run. The Red Forces provided three threat aircraft for both missions. The Red Forces traversed from west to east. The Blue Forces did not know which way the threat was coming from. They were told that there was a high probability that reconnaissance elements from Partiguy would be in the area. HF voice communications was maintained with the OH-58C but no track files were sent.

1.3.9.2.3 The fifth day, two AH-1S' and one OH-58C flew a control run in the morning, a route reconnaissance. The Red Forces flew from north to south.

1.3.9.2.4 On the sixth day in the afternoon, the first test run was made. The AH-1S' and OH-58C performed an area reconnaissance. Tracks were sent to the OH-58C which automatically sent them to the AH-1S'. The Red Forces flew a south to north path through the area of interest.

1.3.9.2.5 The seventh day, one OH-58C flew to Ft. Knox and returned to Ft. Campbell during the hours of darkness. Track files and data were sent from the surrogate TOC to the aircraft.

1.3.9.2.6 On the eighth day, two more runs were made; an attack mission in the morning then a screen in the afternoon. Tracks were provided to the OH-58C which passed them to the AH-1S'. Two threat aircraft in formation flew the pre planned tracks through the area as prescribed.

1.3.9.3 DATA COLLECTION, REDUCTION, AND ANALYSIS.

1.3.9.3.1 Data Collection. The results of the automatic link

establishment were recorded for each link process. After each mission, the pilots were debriefed on the performance of the system. These debriefings were taped.

1.3.9.3.2 Data Reduction. The HF radio performance was scored by time of day and distance. The performance of the system was the subjective view of the pilots.

1.3.9.4 Data Analysis.

1.3.9.4.1 The issue concerning the performance of the system was evaluated as go or no-go. It either performed or it did not. The objective of this test was not to engineer a reliable, sustainable system but to reasonably replicate the OH-58D, RAH-66 and AH-64 sytems.

1.3.9.4.2 The issue of mission effectiveness was completely subjective. Pilot reports on who saw who first was the only criteria to make this determination.

1.3.9.4.3 The issue of display effectiveness was subjective. Debriefings and pilot questionnaires were used to evaluate this issue.

1.4 Results Summary

1.4.1 SUB-TEST 1. SYSTEM PERFORMANCE

1.4.1.1 ISSUE. Can the air picture be effectively processed and displayed in scout and attack aircraft?

1.4.1.2 CRITERIA. Processing and display should allow time for the crew to determine the relative position of air tracks and take appropriate action such as move into attack position or mask.

1.4.1.3 FINDING. MET

1.4.1.4 DISCUSSION. The system worked as anticipated. Targets were sent from the base station to the OH-58C over HF and automatically retransmitted via VHF radio to the AH-1S'. If the aircraft had good doppler and heading information the air tracks were depicted correctly on the display. There were many problems with the equipment on board the aircraft. The major problem was that the CDU could not process global positioning system (GPS) information fast enough to allow the computation of other necessary data. As a result the GPS algorithms had to be

bypassed and the CDU had to use doppler information exclusively for position. This put an extra burden on the crew to keep the doppler updated all the time. On one of the AH-1S' and the OH-58C this was a continuous problem. Another problem existed with the ALE software in the HF radio. It required a significant amount of pilot interface during which no targets were sent in digital burst from the base station. Once the frequency for air tracks was established the system did all the work. Radio communications between aircraft for passing targets was reduced significantly.

1.4.1.5 SUB-TEST 2. MISSION EFFECTIVENESS

1.4.1.5.1 ISSUE. Does the air picture provide potential for improving mission performance?

1.4.1.5.2 CRITERIA. A 10% reduction in travel time to the area of operation. Increased survivability by a factor of 50%. Likelihood of fratricide is reduced.

1.4.1.5.3 FINDING. Met

1.4.1.5.4 DISCUSSION. The air picture definitely helped the pilots see the threat first and mask or engage the threat inside the threats time line for engagement. During the control runs the Blue Forces and Red Forces saw each other virtually simultaneously on both runs. The winner of the engagement was the aircraft that had the best aspect ratio to put weapons to bear. During the test runs, the Red Forces never saw the Blue Forces. Once the Red Forces were within a few kilometers, the Blue aircraft would mask their position and visually follow the Red Force aircraft through the area. Blue Force aircraft were never seen. This was a very dramatic and telling outcome...far better than expected. A down side to the issue, however, was that the air picture disrupted the cavalry mission. Because the pilots had to constantly watch for Threat aircraft, they could not adequately perform their area and route recons or screening missions. An audio queue or an APR-39 type warning would have been better than a video screen. The attack mission was different. The air picture was indispensable in prosecuting the attack. During the final two test runs, ground targets and friendly targets were sent to the aircraft to simulate a fratricide problem. The Blue force aircraft could readily distinguish threat targets; a significant requirement in reducing fratricide.

1.4.1.6 SUB-TEST 2 DISPLAY ADEQUACY

1.4.1.6.1 ISSUE. Is the ATHS CDU operationally suitable as the control and display for the air picture?

1.4.1.6.2 CRITERIA. The features of the display will permit its effective use to enhance mission performance and survivability.

1.4.1.6.3 FINDING. Not Met

1.4.1.6.4 DISCUSSION. The CDU is not adequate as a control display for the air picture. The CDU must perform a myriad of functions such as update the doppler, radio frequency and crypto management, route selection, HF radio ALE, and others. A separate display is needed to keep up with the friendly and enemy situation. It was determined that for cavalry, air assault, and missions other than attack, a simple display such as the APR-39's audio and visual display would be adequate. Attack missions require a separate display perhaps a multi-function display for the air picture. The graphics presented were too big for the display. The three scales provided were adequate.

1.5 Findings

FACTORS		FINDING
ISSUE 1. Effectiveness		
Criteria 1:	Process without error	MET
Criteria 2:	Process and display in less time than the threats ability to fire.	MET
ISSUE 2. Mission Performance		
Criteria 1.	Travel time reduced > 10%	MET
Criteria 2	Survivability increased > 50%	MET
Criteria 3	Reduce Fratricide	MET
ISSUE 3. CDU adequate		
Criteria 1	CDU enhances mission	Not Met
Criteria 2	Compatible with NVG	Not evaluated
Criteria 3	Reliable	Not Met

1.5.1 SUGGESTED IMPROVEMENTS.

1.5.1.1 The key to getting air picture or any target type information to fighting elements is a robust communications

system. The HF ALE used during this test was not very robust. The algorithm was too operator intensive. The radios should automatically select the digital data burst rate based on how well they hear each other. It will be interesting to see how this system is affected by many different mission aircraft in the separate areas of operation; one base station servicing aircraft over different propagation paths.

1.5.1.2 Recommend opening a dialogue with the aircraft survivability equipment personnel within the Project Manager's office for Aviation Electronic Combat in Saint Louis to see how to integrate such a system into the AN/APR-39() display for non attack aircraft.

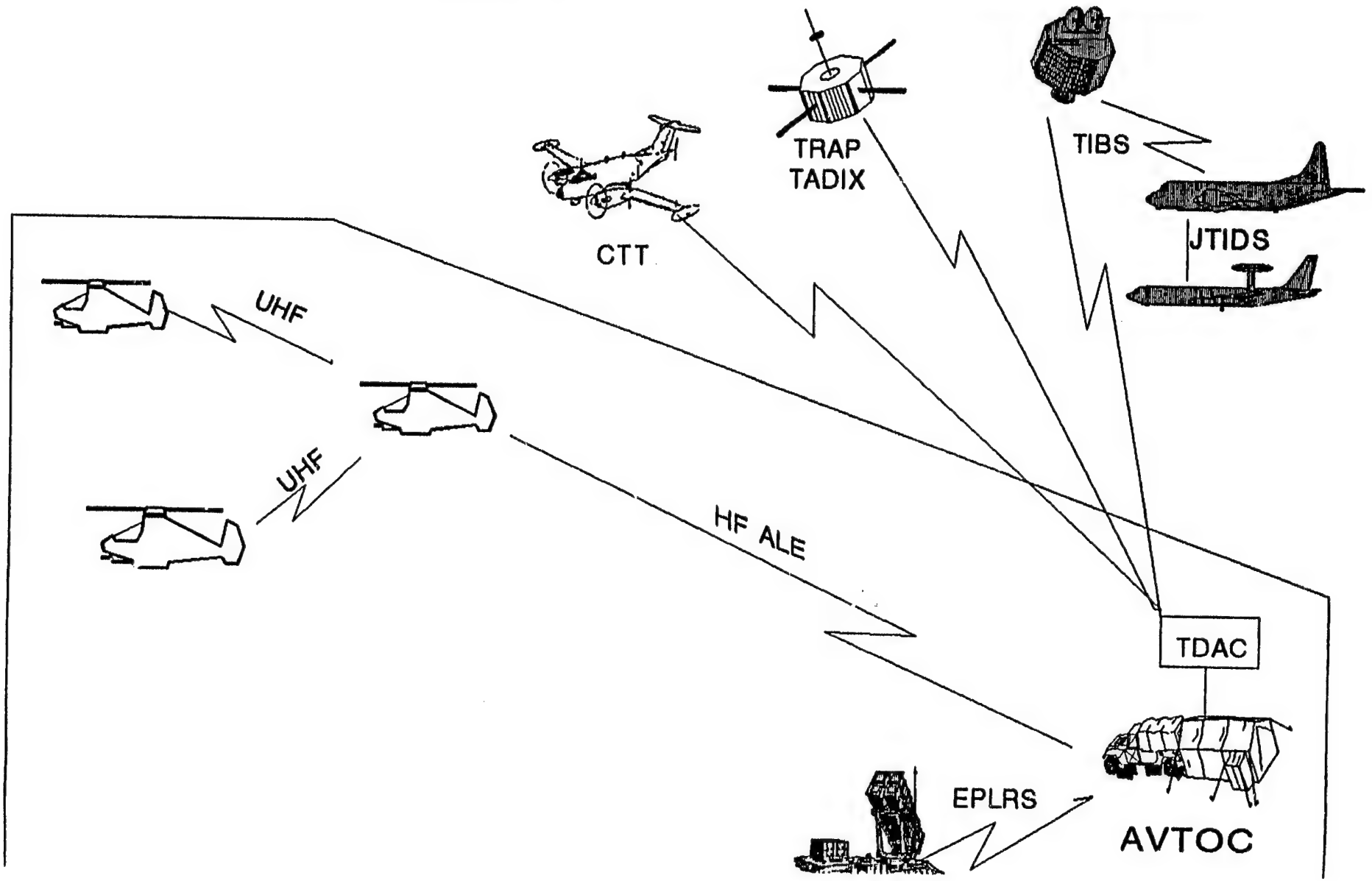
1.5.1.3 Recommend that EID increase their pilot display ergonomics data base from the upcoming combined arms command and control and intra-vehicular information system simulator evaluations.

Appendices:

A. Test Data (Filled in Data Forms)

b. Distribution

CEP829 TARGET HAND-OVER



ANNEX A

Questionnaires:
Communications and Display for Army Aviation Air Picture

NAME ISRAEL JAMES M Rank CW2 Date 26 AUG 92

Years in Army 7+
Years as Army Aviator 5
Total Number of Flight Hours 700
Approximate total # of hours in AH-1 500
Approximate total # of hours in OH-58A/C 20
Approximate total # of hours in OH-58D

Questions:

Training:

1. Was the training on the system adequate. (Yes or (NO)

THEY (TNRS) DID NOT APPEAR TO KNOW WHAT THEY WANTED TO GET OUT OF TESTS.

2. If the training was not adequate, what would you do to improve it?

a. Provide a part task trainer for self paced instruction (yes) or no).
b. Provide more hours of classroom instruction. (yes or (no))
c. More hours of cockpit familiarization (yes or (no)).

3. Comments on training: SYSTEM SO NEW AND INCOMPLETE THAT CLASSROOM TRNR DID NOT DO ALL FUNCTIONS BRIEFED DUE TO SOFTWARE PROBLEMS, SHOULD HAVE MORE TIME FOR ACFT TRAINING NOT ADEQUATE FOR UNIT TNG. (NOT FAMILIARI

SYSTEM PERFORMANCE:

4. Did the system display air tracks adequately? (yes or (no)).

WITHOUT A GPS, AIR DATA WAS NOT RELIABLE BECAUSE OF INACCURATE DOPPLER.

5. Can you use this information for self defense or avoidance? (yes or no)

IF THE SYSTEM WORKED AS ADV. IT would be useful.

6. Were you able to transfer tracks or other information to your team member(s) via ATHS. (yes or (no))

AH-1S WAS RECIEVER ONLY.

7. Is information transfer via ATHS more convenient, easier, faster, better or worse than voice communications?

IT WAS BETTER BUT INACCURATE INFO CAUSED FOR MISTRUST IN THE INFORMATION DISPLAYED.

SUBJECT: Communications and Display for Aviation Air Picture

8. Comments on system performance: SYSTEM TOO BUSY, COULD NOT SEE AIR PICTURE IN BOTH DISPLAYS. PROGRAMING FREQS AND DOPPLER POSITIONS IN ONLY ONE CDU AT ATI. CAUSED EXTENDED PRE MISSION PROGRAMING.

Display:

9. Was the display size, brightness, color, symbology, and readability, and switch location, adequate? YES, ... BUT SCREEN TOO SHINY, GLARE OFF SCREEN LEFT IT UNREADABLE AT TIMES.

10. Was the display location adequate? NO UNIT IN AH-1S COULD NOT SEE well IN back seat; FRONT SEAT PARTIALL Hidden by TSU SIGHT

If not, where is better and why would you displace the display that is there now? CENTER OF PILOT DISPLAY PANEL

11. Comments on display ICS BOX SHOULD BE RELATIVELY CO-LOCATED WITH CDU FOR EASY ER COMMD FREQ CHANGES.

12 Final Comment.

SYSTEM NEEDS WORK: - LOCATION OF CDU,

- GPS SOFTWARE UPDATE TO UPDATE AIR PICTURE DATA,
- DATA RECEIVED WAS SOMEWHAT MISALIGN WITH VERBAL MISSION AND THE RESULTS THAT WERE EXPECTED.
- CONSTANT ATTENTION TO CDU AND UPDATING POSS (DUE TO DOPLER) CAUSED OVER-LOAD AND INATTENTION TO EVENT OUT SIDE OF THE AIRCRAFT.

ANNEX A

Questionnaires:
Communications and Display for Army Aviation Air Picture

NAME TONNER, DAVID A. Rank CW2 Date 26 AUG 92

Years in Army 18
Years as Army Aviator 10
Total Number of Flight Hours 1100
Approximate total # of hours in AH-1 35
Approximate total # of hours in OH-58A/C 600
Approximate total # of hours in OH-58D Ø

Questions:

Training:

1. Was the training on the system adequate. (Yes or NO)

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2. If the training was not adequate, what would you do to improve it?

a. Provide a part task trainer for self paced instruction (yes or no).
b. Provide more hours of classroom instruction. (yes or no)
c. More hours of cockpit familiarization (yes or no).

3. Comments on training: THE AID NOT MAKE US EXPERT ON THE SYS, BUT A UNDERSTANDING WAS THAT WE WERE SIMPLY TO VERIFY THE INFORMATION WAS BEING TRANSFERED IN AN NOE ENVIRONMENT. THE WAS ADEQUATE FOR THAT AMRP.

SYSTEM PERFORMANCE:

4. Did the system display air tracks adequately? (yes or no).

---

5. Can you use this information for self defense or avoidance? (yes or no)

---

6. Were you able to transfer tracks or other information to your team member(s) via ATHS. (yes or no)

---

7. Is information transfer via ATHS more convenient, easier, faster, better or worse than voice communications?

SUBJECT: Communications and Display for Aviation Air Picture

EASIER THAN VOICE WHEN SYSTEM IS UP.

8. Comments on system performance: NEED TO BE ABLE TO GET INFORMATION ON FRIENDLY TRACKS.

Display:

9. Was the display size, brightness, color, symbology, and readability, and switch location, adequate? DISPLAY SIZE WAS OK BUT MORE SCREENS ARE NEEDED, AS IN THE OH-58D

10. Was the display location adequate? YES

If not, where is better and why would you displace the display that is there now?

11. Comments on display NEED TO BE ABLE TO DELETE SPECIFIC TRACKS, FRIENDLY AND ENEMY FROM THE DISPLAY.

12. General Comments

BRIEFING AS TO WHAT THE PURPOSE OF THE TEST WAS. UNDERSTANDING OF THE PURPOSE WAS DIFFERENT FOR EVERY INDIVIDUAL. NO ONE WAS SURE IF THE MISSION WAS ACCOMPLISHED OR NOT.

ANNEX A

Questionnaires:
Communications and Display for Army Aviation Air Picture

NAME Bill Cummings Rank CW2 Date 22 Aug 97

Years in Army 12
Years as Army Aviator 5
Total Number of Flight Hours 650
Approximate total # of hours in AH-1 450
Approximate total # of hours in OH-58A/C 100
Approximate total # of hours in OH-58D _____

Questions:

Training:

1. Was the training on the system adequate. (Yes or (NO))

_____

2. If the training was not adequate, what would you do to improve it?

a. Provide a part task trainer for self paced instruction ((yes) or no).
b. Provide more hours of classroom instruction. ((yes) or no)
c. More hours of cockpit familiarization ((yes) or no).

3. Comments on training: _____

_____

_____

SYSTEM PERFORMANCE:

4. Did the system display air tracks adequately? (yes or (no)).

AIR TRACKS did not match that of actual aircraft

5. Can you use this information for self defense or avoidance? ((yes) or no)

if accurate

6. Were you able to transfer tracks or other information to your team member(s) via ATHS. (yes or no)

N/A - AH-1

7. Is information transfer via ATHS more convenient, easier, faster, better or worse than voice communications?

SUBJECT: Communications and Display for Aviation Air Picture

8. Comments on system performance: Air picture failure was too frequent to be considered reliable

Display:

9. Was the display size, brightness, color, symbology, and readability, and switch location, adequate? All except location in pilot station in AH-1

10. Was the display location adequate? see above

If not, where is better and why would you displace the display that is there now? If possible it would be placed so the CDU screen is not covered up

11. Comments on display When functioning properly the system in my opinion is great and should be added to the AH-1 ASAP

12 Final Comments

ANNEX A

Questionnaires:
Communications and Display for Army Aviation Air Picture

NAME RANDY M. SMITH II Rank WO1 Date 26 AUG 92

Years in Army 3
Years as Army Aviator 2
Total Number of Flight Hours 425
Approximate total # of hours in AH-1 0
Approximate total # of hours in OH-58A/C 380
Approximate total # of hours in OH-58D 0

Questions:

Training:

1. Was the training on the system adequate. (Yes or (NO))

Only enough to somewhat get a feel of it.

2. If the training was not adequate, what would you do to improve it? I would extend the time on using the equipment in the class and hands on.
   a. Provide a part task trainer for self paced instruction (yes or (no)).
   b. Provide more hours of classroom instruction. ((yes) or no)
   c. More hours of cockpit familiarization ((yes) or no).

3. Comments on training: SEE ABOVE

SYSTEM PERFORMANCE:

4. Did the system display air tracks adequately? (yes or no).

Both, it did when A/C + computer were in side.

5. Can you use this information for self defense or avoidance? ((yes) or no)

Any information that gives us advance notice to hostile forces will be a help.

6. Were you able to transfer tracks or other information to your team member(s) via ATHS. ((yes) or no)

7. Is information transfer via ATHS more convenient, easier, faster, better or worse than voice communications?

ATHS is much more accurate and convenient.

SUBJECT: Communications and Display for Aviation Air Picture

8. Comments on system performance: Overall, the system work well and was accurate.

Display:

9. Was the display size, brightness, color, symbology, and readability, and switch location, adequate? yes

10. Was the display location adequate? yes

If not, where is better and why would you displace the display that is there now? NA

11. Comments on display The system requires a lot of classes needed to operate it correctly. the pilot spends a numerous amount of time inside the cockpit, hence it is definately a two (2) pilot aircraft.

12 Final Comments

ANNEX A

Questionnaires:
Communications and Display for Army Aviation Air Picture

NAME HOFFMASTER, RANDY C. Rank CW4 Date 26 AUG 92

Years in Army 21
Years as Army Aviator 15
Total Number of Flight Hours 3000+
Approximate total # of hours in AH-1 2500+
Approximate total # of hours in OH-58A/C 70+
Approximate total # of hours in OH-58D Ø

Questions:

Training:

1. Was the training on the system adequate. (Yes or NO)

YES

2. If the training was not adequate, what would you do to improve it?

a. Provide a part task trainer for self paced instruction (yes or no).
b. Provide more hours of classroom instruction. (yes or no)
c. More hours of cockpit familiarization (yes or no).

3. Comments on training:

SYSTEM PERFORMANCE:

4. Did the system display air tracks adequately? (yes or no).

NO

5. Can you use this information for self defense or avoidance? (yes or no)

IF it worked as advertized yes

6. Were you able to transfer tracks or other information to your team member(s) via ATHS. (yes or no)

N/A AH-1 pilot

7. Is information transfer via ATHS more convenient, easier, faster, better or worse than voice communications?

N/A Same

SUBJECT: Communications and Display for Aviation Air Picture

8. Comments on system performance: many, many problems with the equipment all were debriefed with Air picture personnel

Display:

9. Was the display size, brightness, color, symbology, and readability, and switch location, adequate?

Same as #8

10. Was the display location adequate? AH-1 Front seat yes AH-1 backseat NO

If not, where is better and why would you displace the display that is there now?

Same as #9

11. Comments on display

12 General comments

This equipment is going in the right direction. the user's (pilots) have virtually No hand intell at all IN combat.

ANNEX B

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